

REMARKS

Claims 1-11 and 13-15 are pending in the application. Claims 1-11 and 13-15 are rejected. All objections and rejections are respectfully traversed.

A supplemental Information Disclosure Statement and a Proposed Drawing amendment, including a substitute Figure 5, are submitted herewith.

In paragraph 1, the Examiner notes the claims have been examined after the entry of an Amendment dated April 8, 2004.

In paragraph 2, claims 1-11 and 13-15 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make or use the invention.

In particular, the Examiner asserts that the specification fails to provide any description regarding “the type of object-oriented programming structure used to model an object.”

Further, in the Examiner’s reply to the applicant’s arguments (paragraph 4 of the office action), the Examiner requires objective evidence necessary to show enablement to one of ordinary skill in the art.

As stated in the specification at page 10, line 1, section titled **Operators**, “In order to properly define a class, it is also necessary to define the applicable operators

(methods) 104. For the above constructs, the operations are defined according to *geometric algebra*.” (emphasis added).

At the time the application was filed, a number of software packages using object oriented programming to model an object using operators defined according to geometric algebra were readily available to a person of ordinary skill in the art. For example, Mann, et al. “The making of a geometric algebra package in Matlab,” University of Waterloo, Research Report CS-99-27, 1999, describe a software package called ‘GABLE’ which is “a hands-on tutorial on geometric algebra that should be accessible to the second year student in college,” see page 1, Introduction, first paragraph. Section 5 describes specific implementation details of object-oriented programming of operators defined according to geometric algebra. In particular, section 5.2 describes the object-oriented programming structure of Matlab objects. A supplemental IDS including the Mann, et al. reference is submitted herewith. Further, the Examiner will note reference [3] on page 25 of Mann, et al., which identifies a link to the software package described in the Mann et al. reference. The Applicants assert that the Mann, et al. reference is sufficient objective evidence necessary to show enablement to one of ordinary skill in the art without resorting to undue experimentation.

The Examiner also asserts that the Specification at page 17, line 5 – page 18, line 2, “fails to explain how the ‘well chosen spheres and planes’ are actually chosen; such information appears necessary ‘to generate a model of the object’ as required in independent claim 1.”

The section of the Specification referenced by the Examiner includes references to Figure 5 of the Drawings. At page 17, lines 6-16, the Specification teaches the following:

“Figure 5 shows a robot 501 operating within the confines of an obstacle 502. The obstacle is associated with bounding planes and box 503, and bounding spheres 504, and the robot is associated with bounding spheres 505. *As the robot 501 moves, it is important to avoid hitting the obstacle 502.* The calculation to determine interference must be made quickly.

Our invention models the robot and obstacle by a few well chosen spheres and planes in homogeneous form. We then test for interference using the homogeneous operations as defined above. ***If the spheres that model the robot are not allowed to intersect the spheres and planes of the obstacle, then it is ensured that the robot will not collide with the obstacle.***
(Emphasis added)

It would be clear to a person of ordinary skill in the art after reading the Specification while referencing Figure 5 that “well chosen” spheres are defined as those spheres 504 - 505 that mark potential points of contact between the robot 501 and the obstacle 502.

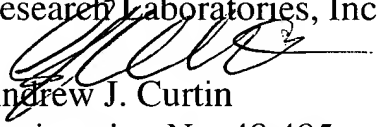
A proposed amendment to Figure 5 is also submitted herewith. The proposed amendment corrects typographical errors in the numbering of items in the figure. No new matter is added.

In view of the foregoing, it is respectfully submitted that the application is in condition for allowance and an early indication of the same is courteously solicited. The Examiner is respectfully requested to contact the undersigned by

telephone at the below listed telephone number, in order to expedite resolution of any remaining issues and further to expedite passage of the application to issue, if any further comments, questions or suggestions arise in connection with the application.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 50-0749 and please credit any excess fees to such deposit account.

Respectfully submitted,
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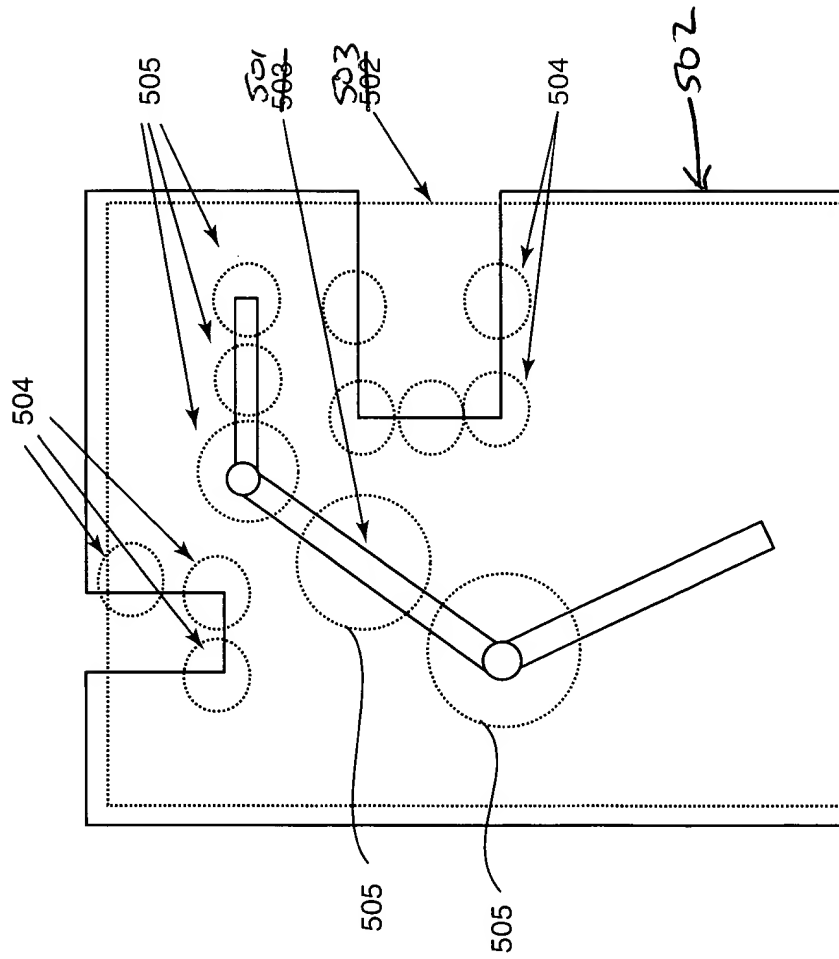


FIG. 5